



POLICY REPORT
DEVELOPMENT AND BUILDING

Report Date: June 22, 2009
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Meeting Date: July 9, 2009

TO: Standing Committee on Planning and Environment

FROM: Manager of the Sustainability Group in consultation with the Director of Legal Services, and General Manager of Engineering Services

SUBJECT: Report on Electric Vehicle Charging

RECOMMENDATION

- A. THAT Council approve the provision of infrastructure for charging electric vehicles (EVs) in new multi-family buildings, generally in accordance with Appendix A;

And that Council instructs the Director of Legal Services to bring forward amendments to by-laws, generally in accordance with Appendix A, to implement this scheme.

- B. THAT an 18 month grace period be provided following the enactment of the requirements for EV charging infrastructure.
- C. THAT Council direct staff to develop a strategy for retrofitting existing buildings that explores the use of incentives to encourage the installation of EV charging infrastructure in existing buildings.
- D. THAT Council direct staff to partner with Easy Park to pilot a limited number of public EV charging locations at existing City owned EasyPark lots, and explore possibilities to expand this pilot to on-street locations, at a cost to the City of not more than \$15,000, source of funds being the 2009 Engineering Operating Budget - Climate Protection Program.

CITY MANAGER'S COMMENTS

Developing capacity for electric vehicle charging, as outlined by the Mayor's Greenest City Action Team Quick Start Report, is an essential first step for encouraging the adoption of

electric mobility in Vancouver. The recommendations of this report advance a number of important Council policy directions related to greener buildings, climate protection and sustainable transportation. They will also encourage investment in Vancouver's green economy by providing infrastructure and pilot projects needed to attract green jobs and technologies related to electric mobility.

COUNCIL POLICY

In March 2005, Council approved the Community Climate Change Action Plan to reduce greenhouse gas (GHG) emissions in the community to 6% below 1990 levels by 2012.

In March 2007, Council passed a motion directing staff to begin planning for significant, long range GHG reductions with the eventual goal of becoming a carbon-neutral city.

In May 2007, Council adopted amendments to the Building By-law which included environmental protection objectives. Although no new "green building" requirements were added to the by-law at that time, the environmental protection objectives were put into place to facilitate the future development of the City's Green Building Strategy.

In July 2007, Council adopted targets to reduce community GHG emissions to 33% below current levels by 2020 and 80% below 1990 by 2050. In addition, Council adopted the target of having all new construction in Vancouver be GHG neutral by 2030.

In January 2007 Council approved membership in Plug-in-Partners a grass-roots initiative with a goal to demonstrate to automakers that a market for flexible-fuel Plug-in Hybrid Electric Vehicles (PHEV) exists today.

In May 2008, Council adopted an Off-street bicycle parking requirements report which included allowance for a vehicle charging plug in bicycle parking locations.

In June 2008, Council adopted the Green Homes Program which included a requirement within the Building By-law to require provisions for Plug-in Electric Vehicle (EV) charging infrastructure in all new one and two family dwellings.

In September 2008, Council approved Street and Traffic By-law changes to allow Neighborhood Zero Emission Vehicles to travel on streets with speed limits of 50 km/hr or less.

SUMMARY

Electric vehicles (EVs) present a significant opportunity to reduce greenhouse gases from the light duty transportation sector in Vancouver. EV automakers have clearly identified that to support mass production of EVs, urban communities will need to enable the necessary charging infrastructure.

Last year, the City instituted by-law changes to provide EV charging infrastructure for new one- and two-family dwellings. This report recommends providing EV charging infrastructure for 10% of parking stalls in new multi-family buildings at the initial stage, along with a process by which this requirement could be adapted in future phases. It also recommends a public charging pilot at a number of publicly available parking locations. Lastly, there is a

recommendation to develop a strategy to provide incentives for the retrofits of existing buildings with charging infrastructure as the market for EVs increases.

Staff have consulted widely with the auto industry, utilities, vehicle associations, other levels of government, and have also held initial discussions with the development community to consider options for charging EVs. There is broad support from the majority of these stakeholders to proceed with these recommendations. Within the development community questions were raised about the value of building a limited infrastructure now, when there are still only a few EVs on the road today. To address this feedback, staff have developed a phased approach that is informed by ongoing EV market research and stakeholder consultation.

This report recommends a reasonable level of EV charging infrastructure now in new multi-family buildings to support early EV adopters, while at the same time creating a plan for future upgrades to make it easier for strata corporations to increase the number of charging locations later as needed. Staff will work with the development community to explore other mechanisms to offset these new incremental costs. Introduction of these by-law amendments will help to enable the earlier adoption of EVs in Vancouver, and provide an attractive location for automakers to deploy EVs.

PURPOSE

The purpose of this report is to recommend next steps towards expanding local charging infrastructure for new multi-family buildings, existing buildings, and public parking locations to support market adoption of EVs in Vancouver.

BACKGROUND

In 2005, the City of Vancouver Community Climate Change Action Plan estimated that vehicles powered by internal combustion engines produce approximately 1/3 of the City's overall community greenhouse gas emissions. In response, staff have continued to encourage more sustainable modes of personal transportation, while exploring new low carbon vehicle technologies and fuel solutions. Plug-in electric vehicles (EVs) offer one promising vehicle solution that has the potential to significantly reduce passenger vehicle greenhouse gas emissions. Automakers are now indicating that the commercial launch of these vehicles will happen sooner than expected due to advances in battery technology and renewed consumer demand. Still it may be a number of years before these vehicles are available in large commercial volumes (see Appendix B).

Staff reported to Council in September 2008, outlining the City work in progress to enable the local use of EVs. A more detailed summary of staff efforts to date, as well as a status of the EV industry is included in Appendix B. This information provides further context for the next steps recommended in this report.

In addition to supporting the City's sustainable transportation and climate protection objectives, this report will directly support the Mayor's Greenest City Action team efforts to advance electric mobility in Vancouver.

DISCUSSION

This report addresses the next phase of infrastructure work including:

- **Amending By-laws:** Requiring EV charging infrastructure in multi-family buildings.
- **Retrofitting Strategy:** Developing a strategy to enable the retrofitting of existing residential buildings with EV charging infrastructure (including guidelines, and incentives).
- **Public Charging Pilots:** Piloting public EV charging infrastructure to support early adopters of EVs and to help foster a public dialogue on the subject.

1. Amending By-laws

The following sections explain rationale for regulation, provisions for the charging infrastructure, and some factors to consider related to parking allocation.

Rationale for Regulation

Providing EV charging infrastructure to new multi-family buildings and new City-owned public parking facilities is a natural next step beyond the EV charging infrastructure changes implemented last year for new one- and two-family dwellings. Residents living in multi-family homes within the urban community tend to have shorter trips in city driving conditions. These driving patterns are well-suited to the operational capabilities of EV's.

Introducing a regulation instead of a voluntary measure will help to future-proof the new multi-family building stock. This effort is also a strategic move intended to encourage EV makers to deploy EVs in our City as soon as possible, which may in-turn help create new local EV business opportunities in sales, service, and infrastructure.

Vehicle Charging Provisions in By-laws - New Multi-Family Residential Homes

The by-law framework outlined in Appendix A proposes revisions to by-laws for multi-family homes to require a baseline level of EV charging infrastructure now to support early EV adopters, as well as planning for capacity to support future EV market adoption.

The cost to install vehicle charging infrastructure is greater in multi-family residential buildings compared to single family homes due to the extra electrical capacity and wiring required on site for many vehicles to be potentially charging simultaneously. To support these building and electrical by-law changes, staff carefully considered the associated costs in several different scenarios up to and including providing charging infrastructure for 100% of all the available in-building parking stalls. Staff retained an independent cost consultant who has worked with staff and stakeholders using the latest data from industry and actual project pro-formas to determine what the approximate costs of different charging requirements would be. Staff also applied lessons learned from EV charging infrastructure packages that were negotiated in both Southeast False Creek and the East Fraser Lands.

Early cost estimates indicate that an initial deployment of EV charging infrastructure for 10% of the parking stalls, with allowance for future upgrades, would cost less than 0.5% of the building cost. Although this deployment strategy presents a new cost to developers, the phase-in approach will, 1) enable early adoption of EVs in our community, 2) allow for later expansion as the market demands, 3) allow the development industry to test the market take-up of EV charging capable parking stalls, 4) introduce limited new costs that are not likely to adversely affect land values.

An 18 month grace period will be provided following the enactment of the requirements for EV charging infrastructure to allow time for land costs to adjust.

Staff will work with developers to help find possible strategies and partners to offset the new incremental costs associated with this infrastructure.

Allocation of charging infrastructure

It is understood that parking stalls are often allocated during unit purchase. Since only a small percentage of parking spots will have allowance for vehicle charging, situations may arise where a home owner without an EV needs to trade a parking spot with a new EV owner to access overnight charging. It is the responsibility of the building owners to ensure fair allocation of parking stalls with EV charging capability.

Staff will explore opportunities to provide strata corporations and building owners with tools, based on leading practices, to help manage EV parking stall allocation on a voluntary basis.

2. Retro-fitting Strategy

Staff recognize that while changing regulations to support charging for EVs in new buildings is important, further efforts are required to support early adopters of EVs who live or work in existing buildings with no access to electric outlets.

For this reason the City, Provincial Government and BC Hydro have partnered with the Federal government (NR CAN) to fund the development of new Canadian guidelines for retro-fitting buildings to provide for EV charging infrastructure. These guidelines will offer information like costs and charging technology options, so that developers, building owners, strata councils, fleet managers and other businesses will understand their options before hiring a contractor to complete the work.

When these draft guidelines are completed this summer, it is recommended that the staff should begin leveraging these guidelines to negotiate possible retro-fitting incentive programs funded by the Provincial and Federal Governments.

3. Public Charging Point Pilots

Most personal-use EVs can charge overnight at the user's place of residence. However, in order to deliver a robust EV infrastructure strategy, the City should begin to offer some public charge locations to provide EV owners have the flexibility charge during the day away from home.

Staff recommend a pilot program to consider a few scenarios both on-street and off-street. The pilot should be prioritized to take advantage of low cost conventional electric infrastructure at City owned EasyPark parking lots first, followed by considering the public right-of-way and private locations later.

- ***First Priority: City Owned Pay Parking Lots***

Pay parking lots are an excellent off-street charging location because they are distributed throughout the city, and because most locations already have plug-ins for servicing purposes. Staff have inventoried existing EasyPark lots for plugs, and evaluated the capacity of some of locations. The electrical infrastructure is sufficient to provide at least a few charging locations to support a pilot program. EasyPark has expressed a willingness to lead this portion of the pilot.

- ***2nd Priority: On-street curb-side charging***

These very public charging locations could serve as a powerful reminder of the City's commitment to provide innovative solutions to address climate change. For example, San

Francisco is now piloting a few curb-side charging locations across from their City Hall. This portion of the pilot should be limited to a few locations because special secure charging equipment will need to be evaluated. Staff are working with the BC Government and BC Hydro to consider possible external funding sources.

- *3rd Priority: Community Centres and Parks*

Some citizens have reported that our community centers and parks are also possible charging locations. Staff do not have a plan yet to inventory the electrical infrastructure for these lower priority locations.

- *Other Locations*

Other possible locations for public charging include work sites and shopping malls. These locations will have to be scoped further and will depend on staff's ability to encourage private land holders to participate.

PUBLIC CONSULTATION

Staff have consulted extensively with a range of stakeholders including:

- **EV users**

The City has received periodic inquiries from early adopters of EVs (cars, scooters and bikes) who have encouraged the City to provide new charging locations. Many have explained that there is a lack of charging locations in their parking garage, and that they don't have a place to top off their EV charge at public parking locations.

- **Vancouver Electric Vehicles Association (VEVA)**

VEVA is the key local advocacy group encouraging the City to leverage its sphere of influence to enable the use of EVs. Over the past two and a half years their members have volunteered significant time to help assess options and scenarios for this report, and to lobby federally for updates to codes and standards to allow Vancouver to move forward with by-law changes before any other city in Canada. VEVA has encouraged the City to plan for a future when most cars will need to have the capability to plug in every parking location. See VEVA letter of support attached in Appendix C.

- **Urban Development Institute (UDI)**

In November of 2008, UDI was notified that staff were exploring an update to City by-laws to allow for EV charging infrastructure. A presentation was made to the UDI in April, 2009 laying out a proposal to have charging infrastructure for 20% of parking stalls in new multi-unit residential buildings. Members of the UDI liaison committee expressed concern that this target was too high given the cost of providing the infrastructure, the lack of wide spread market penetration of the vehicle technology, and BC Hydro's capacity to deliver the additional power required to charge these vehicles. To address these issues and others, City staff struck a working group with UDI and BC Hydro to develop an approach that addressed these concerns. Since that time staff have shared their research and reports, and initial drafts of this report. UDI membership has had direct input into the writing of the report.

The UDI working group members have continued to advocate for a maximum 5% of parking stalls initially with charging locations.

- **BC Hydro**

BC Hydro is a key partner on this project, with a new strategy to help enable the use of EVs in this region. The BC Hydro Chief Technology Office has helped the City to understand broader

implications of these proposals, and they are the lead partner on the development of guidelines and public charge locations.

- **BC Government**

The BC Government is another key partner helping to set policy, developing incentives, and at times providing necessary seed funding.

- **The Canadian Standards Association/Canadian Electric Code Committee**

This group supported our locally initiated lobby effort to update sub-section 86 of the Canadian Electric Code on vehicle charging, so that our local building and electrical by-laws will be relevant for EVs.

- **Global automakers**

A number of leading global automakers, including Mitsubishi, GM, and Nissan have strongly encouraged the City to continue to accelerate our local charging infrastructure work to support market adoption.

- **Canadian and local EV solution providers**

A number of local EV solutions providers, including Dynasty Electric Vehicles, and REV Motors, have expressed an interest to be part of the City's efforts to enable the use of EVs either with the deployment of EVs or the development of the public charging infrastructure.

- **Federal Government**

A new supporter of the City's local EV enabling efforts, Natural Resources Canada (NRCAN), is providing funding for Canadian vehicle charging infrastructure guidelines at the request of the City, BC Hydro and the BC Government. NRCAN will also need to be a key partner later to help provide retro-fitting incentives.

- **Electric Mobility Canada (EMC)**

EMC has often provided support for our local infrastructure work, and they have ensured linkages to the new Federal Government EV road-mapping efforts.

- **North American EV charging solution providers**

Several of the top EV charging companies in North America have expressed their readiness to provide innovative solutions for the public charging pilot.

- **The Rocky Mountain Institute (RMI)**

One of the outcomes of the Mayor's Greenest City Action team work was to have staff explore the possibility to join RMI's Project Get Ready initiative designed to help large North American Cities prepare a cohesive 5 year plan to enable EVs led by a local champion and an action group of community leaders. RMI has indicated recently that our City is a good candidate to join this initiative in part because of the City's early EV charging infrastructure work.

FINANCIAL IMPLICATIONS

The initial phase of the public charging pilot, using existing EasyPark electric infrastructure, is forecasted to result in minimal costs to Easy Park and may result in new market opportunities. Staff estimate that the cost for electrical service for EV's using the EasyPark locations will be less than \$70 per year per EV parking stall. This cost will be accounted for in EasyPark's operating budget, along with a one time cost of \$1000 to install signage.

Staff have allocated \$15,000 from the Climate Protection Program, within the 2009 Operating Budget in order to fund the delivery of the on-street portion of the public charging pilot. Staff will also work with the BC Government and BC Hydro to consider possible external funding sources to assist with the delivery of this charging pilot.

ENVIRONMENTAL IMPLICATIONS

Greenhouse gases from personal transportation represent approximately 33% of the total community greenhouse gas emissions in Vancouver. Due to British Columbia's large hydro electricity assets, each new EV in Vancouver reduces these emissions by about 4 tons/yr relative to a typical mid-sized gas powered vehicle.

While deployment of EVs is limited today, EV industry experts anticipate significant growth of this market in the next 10 years. As fuel prices increase over time, it is anticipated demand for EVs will grow resulting in a significant new opportunity to reduce greenhouse gas emissions.

CONCLUSION

Vancouver needs to make significant reductions in greenhouse gas emissions to achieve our local targets. There is no "silver bullet" low carbon vehicle solution available today, though EVs show great promise.

This report makes recommendations for phasing in the EV charging infrastructure for multifamily homes, existing buildings, and public parking locations over a reasonable period of time.

The City has adopted a 'build-it and they will come' approach. There is evidence that City efforts are making a difference with at least three automakers considering Vancouver as an early deployment location for EVs, including Mitsubishi Motors Corporation who recently announced a non-exclusive agreement with the City, BC Hydro and the BC Government to test their new EV in the City fleet.

There are at least three main reasons for building this infrastructure now in new buildings versus waiting to retrofit. First, there is a growing population of EVs, including cars, scooters and bikes that require a charge overnight in multi-family homes. Secondly, early adopters have already confirmed that it is very challenging to individually convince their building owners and strata councils to retrofit the infrastructure. And lastly, the City must find new ways to significantly reduce greenhouse gas emissions from our transportation sector if we are to meet our greenhouse gas target of 33% below 2007 levels by 2020, even though this may come at a marginal new cost to the development industry.

The directions recommended in this report will help to put Vancouver along-side other leading cities best positioned for wide deployment of EVs.

APPENDIX A

Criteria for the development of By-laws requiring Electric Vehicle Charging Infrastructure in Multi-Family Buildings

Initial By-law Amendment:

Provide infrastructure for electric vehicle charging in 10% of parking stalls in multi-unit residential buildings, and make allowances for future upgrades.

Program Development and Maintenance:

Review amount and nature of EV charging infrastructure annually over the next 5 years with the development community, and other stake-holders, to ensure this EV charging infrastructure supports current needs and future demands.

As required, include provisions for signage to exclude charging of older types of EVs that may require additional venting.

APPENDIX B: Summary of City Support for EVs, and EV Industry Status

The recommendations and strategies discussed in this report are based on research compiled from industry experts, Association groups, and other stakeholders. This Appendix outlines the City's ability to leverage infrastructure, as well as the general status of the EV commercialization and EV charging infrastructure to provide some additional context for the report.

City Lever: Infrastructure

Automakers are responsible for building the EVs that many people want to drive today. Local, Provincial and Federal Governments also have the ability to develop policies, incentives, and, most importantly, infrastructure to support the early adoption of EVs.

Two years ago, staff initiated a national lobby effort, along with Electric Mobility Canada and the the Vancouver Electric Vehicle Association, to update and simplify the Canadian Electric Code for charging EVs in order to support local Building By-law amendments. That effort was successful and the new CEC section 86, combined with the prescriptive requirements defined in Vancouver's revised Building, Electrical, and Parking By-laws, offer an approach that other jurisdictions might follow.

The main goal of the City infrastructure work is to require an initial number of overnight charging points in new residential buildings, encourage the retro-fitting of existing buildings, and provide some public convenience charging infrastructure. Also, because the most common form of EVs in Vancouver today are electric bikes and smaller electric scooters, the City has updated parking by-laws in 2008 to enable plug-ins in off-street bicycle parking areas.

The local work on building and parking by-laws has helped staff to influence policy decisions at other levels of government. In 2008, the City was a founding member of the Provincial Government led Plug-in Vehicle Working Group, along with BC Hydro. This group now helps to facilitate plug-in electric vehicles in a much more coordinated way.

EV Industry Status

Staff have observed significant new advances with battery technologies, and new commitments from automakers and governments to produce plug-in EVs sooner. Even so, some experts believe it will take a number of years before the industry reaches a low volume commercial level¹. The vehicle technologies are certainly viable now, but the early costs of production are, for a now, a little too high for EVs with similar performance to gasoline engine vehicles.

The sequence of availability of EVs is expected to start with speed limited neighbourhood electric vehicles, city electric vehicles, and existing gasoline powered vehicles converted to EVs, will reach low commercial volumes first. These EVs will be followed likely by plug-in hybrids, and then full performance battery electric vehicles. Fuel cell electric vehicles are still a possible longer term solution.

The US is planning to offer new credits for the purchase of EVs because at the early stage, these vehicles will cost more than combustion engines. The City is encouraging the Canadian

¹ The 'Low volume commercial' level of production was defined in 2007 by a California Air Resources Board ZEV panel as 10,000 units a year globally. Other levels included: demo's- 100's/yr; pre-commercial-1000's /yr; and mass commercialization-100,000's/yr

Government, through Electric Mobility Canada, to also consider offering similar vehicle credits.

Status of Charging EVs

The vast majority of EV charging will likely be done at home overnight, and off peak load on the grid. Adoption issues include availability of plugs, time required to charge the vehicles which is limited by capacity of the local and upstream electric utility. Some plug-in EVs, like the new City of Vancouver plug-in hybrid Prius, can be easily charged overnight via a receptacle supplied by a dedicated 120V 20 Amp circuit, which will provide an average of 10 Km of driving range per hour of charging. Some full performance EVs, with larger battery capacity and range, take longer to receive a full charge from the same circuit. For this case a medium speed of charging is likely to be standardized to allow a full charge in about 3 hours by a 240V 40 Amp power supply. This may be available at both residential and public destination locations at a higher cost.

Full performance EV makers are also providing an option to increase the charge rate by using a higher voltage circuit. This may be useful for fleet applications when vehicles need to be available for longer periods of time.

Additionally, fast charging for a 20 minute or less fill up is contemplated with specialized and expensive equipment from high power infrastructure at public charge stations. This will be essential for inter-city and longer distance travel or by fleets such as taxis doing longer distances with numerous stops. Some EV makers are planning for very fast charging rates from high power charging equipment.

It is expected that the cost of batteries will come down as more vehicles enter production, enabling larger battery packs and greater driving range in EVs. The time to charge will remain invariant with EV infrastructure capacity. Overnight charging on lower power outlets off peak (i.e. 120V 20Amp) will suffice for the majority of charging given that the average trip distances in Vancouver are under 50km.

Metering

The design scenarios for power supply metering continue to evolve. It is likely that automakers will encourage end-point (or in car) metering which will eliminate the costly step of having to run wires back to individual residential meters.

Also, smart metering or time of use billing may be introduced to assist with peak demand loads. Smart charging which works with smart metering is planned by the American SAE J1772 standard. This combined with building management systems will address peak load management in the future. The expected reductions through conservation in peak load may be as much as 40% per residence allowing existing infrastructure and supply capacity to suffice.

Most electric vehicle charging will most likely occur overnight. The proposed by-law anticipates evolving standards and these management strategies. Therefore this report proposes infrastructure to be installed which is needed now and delays expensive metering equipment installations until they are needed. What will not change is the total capacity and wire size because average driving range is constant and most cars are parked longer than they need to charge.

Appendix C- Vancouver Electric Vehicle Association Letter

Mayor and Councillors
City of Vancouver
453 West 12th Ave
Vancouver, BC V5Y 1V4

June 12, 2009

**RE: Recommendations from the Manager of the Sustainability Group,
Report on Plug-in Vehicle Charging before the Standing Committee on
Planning and Environment, 2009**

Your Worship and Councillors:

The Vancouver Electric Vehicle Association (VEVA) strongly supports the forward thinking put forward by the Manager of the Sustainability Group in the Interim Report on Plug-in Vehicle Charging. Operational infrastructure for charging electric vehicles (EVs) is an essential prerequisite to the adoption of EVs.

Charging batteries takes time, as we are all familiar with from using our cell phones and laptop computers. EVs have large batteries and they require either significant time or very high power electrical infrastructure to charge. The amount of power an EV consumes on average is one half that used by an average household, or comparable to running an electric dryer for a few hours a day. For this reason most EV charging should take place at home, overnight and off-peak load times of the grid.

Most residential buildings in Vancouver lack any electrical outlets in parking garages, let alone outlets of sufficient power to charge an EV in a reasonable amount of time. The standard branch circuit outlet on a shared circuit is very marginal for all but the smallest or shortest range capable EVs. Running long extension cords from apartment windows is not a feasible solution.

New Construction

The recommendation to provide operational infrastructure for charging electric vehicles in all new multi-family residential buildings is increasingly important as density increases. As new EV models have been announced by most of the major auto makers, it is urgent to start building this infrastructure.

There has been some debate over the cost of installing EV infrastructure and how soon EVs will be widely available, which has led to proposals to delay full implementation. The average cost of a parking stall without electricity is about \$30000. VEVA estimates the average costs to fully implement EV infrastructure with smart demand load control at time of construction is around \$1500 per parking stall. EV infrastructure is much less expensive at the time of design and construction of new buildings. VEVA encourages council to adopt our recommendation to complete 100% installation at the time of construction rather than delaying only to incur higher costs later. Our and other studies support end user willingness to bear this expense.

A number of considerations support a full, not a partial or a delayed implementation in new construction.

Delaying implementation costs more.

- The cost to not install or rough in adds about 40% to the total cost in future.
- The cost to install 10% of the plugs is almost a third of the cost of a 100% installation.
- The cost to install 10% plus rough-in now, costs almost 3 times as much per plug initially.
- The cost to install 100% now with smart load control is only about 30% more than installing 10% plus rough-in initially.
- Smart load control technology shaves peak loads and saves costs.
- Upgrading the service supply to each building is a major renovation for BC Hydro.
- Studies of early adopters indicate a willingness to pay the cost of plugs now.

A phased approach adds administrative overhead.

- Administering a partial implementation and maintaining updates will introduce complex by-laws, require regular re-training of city staff and tradespeople, as well as the ongoing cost of re-evaluation and updates. By comparison a similar requirement in the electrical code requires a dedicated plug for refrigerators, dryers, and stoves and is easy to implement and does not require annual review.
- The detailed design for electrical plans is not done on project start up so the advance notice needed on smaller Part 9 buildings is less.

We need to get ready now.

- Almost half of Vancouver residents live in condos in the inner core and typically drive less distance than average so are more likely to be early adopters of EVs creating demand for plugs in condos.
- Other cities are installing a public infrastructure now and are leading Vancouver in green initiatives.
- The automotive industry in North America is being re-structured with electric vehicles as a key component.
- In 2009 most of the major automotive companies have announced plug-in vehicle models for near future production.
- Plug-in auto mobiles, as 100% battery electric and plug-in hybrids, will soon join the thousands of electric bicycles, scooters, low-speed electric vehicles and electric conversions now on city streets.

VEVA recommends a 100% installation of plugs in all new residential buildings at time of construction as the most economical approach to reducing GHGs ASAP. This can be achieved by simply amending the Vancouver electrical code (Section 26) to add a rule to say that "at least one receptacle shall be provided for each car space in a garage or carport serving residential occupancies for use with an electric vehicle charging system in accordance with Section 86".

If only a partial installation is done, it is very important to rough-in electrical infrastructure raceways and space for future equipment to avoid high retrofit cost.

Retrofitting Existing Buildings

Existing buildings will also need to be upgraded to provide this same infrastructure.

Renovations to green our residential buildings need to include incentives that support the installation of EV charging infrastructure. Tradespeople, owners and others will need guidelines. The work currently ongoing by the City of Vancouver, the Provincial Government, BC Hydro, Electric Code Committees, NRCAN, and others needs continuing support.

Public Charging Access

Most charging will take place daily, at home overnight, but EVs still have limitations on range.

When the batteries run low on longer trips, owners need planned access to public charging locations. The ideal locations are in public parking lots, shopping malls, curbside parking, and other popular destination locations such as employee parking lots, popular city park attractions or community recreation facilities where City residents and visitors spend time to allow for top-up charging. VEVA notes that due to the high efficiency of EVs, and low electricity costs in BC, that profitable fee based charging in public locations is possible and acceptable to EV motorists

VEVA notes that relatively few distributed public charging locations would be required to provide for the occasional need to charge away from home at peak times and to indicate an EV friendly city. As of 1998 there were only 39 gas stations in Vancouver, down from 248 in 1970. There are just 53 auto propane filling locations in BC, which was sufficient for some early adopters to transition to that alternative fuel. As fuel tanks provide a greater range and are faster to fill than EV batteries, a comparable number or more of public charging locations spaced within two km of each other are necessary to support the adoption of EVs in Vancouver. If made available for public use, the existing plug-ins at Easy Park lots and other available locations is a simple, inexpensive and viable solution.

Thank you for considering this letter and for considering the recommendations put forward by the Manager of the Sustainability Group.



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